

# THE ENERGY OBSERVER

Energy Efficiency Information for the  
Facility Manager

Quarterly Issue – December 2004

## Daylighting

**The Energy Observer** summarizes published material on proven energy technologies and practices, and encourages users to share experiences with generic energy products and services. This quarterly bulletin also identifies informational sources and energy training for facility managers and staff. **The Energy Observer** is a service of the Energy Office, Michigan Department of Labor & Economic Growth.

Are you considering daylighting for a new building or retrofit? Daylighting is the use of natural sunlight in a building through windows, skylights, etc. in order to reduce the amount of lighting and electricity that is needed, as well as to create a more nature and enjoyable interior. Implementing daylighting strategies into a classroom or workspace improves occupant performance, lighting quality, energy savings and education.

This Energy Observer discusses ways to achieve ideal lighting for your situation and, the benefits of daylighting.

### WHY DAYLIGHTING?

There are many advantages to incorporating daylighting into your buildings. The following are areas in which you can benefit by incorporating natural daylight.

- If designed with all building systems in mind, daylighting can often save **energy** and energy costs. Properly utilized

windows/skylights can lead to electrical demand reduction, heating season solar gains, reduced HVAC equipment sizes, reduced ventilation requirements and reduction of lighting requirements.

- Natural light aids in keeping the body's **natural rhythm** intact. This can potentially lead to more co-operative students, improved body growth and overall health.

- Natural light or daylight provides the highest quality of light for **visual tasks**. By enhancing colors and visual appearance of objects, the eyes can better focus on smaller details.

- Daylighting provides a **learning tool** for building occupants. Students can learn from nature as well as the technology. Also demonstrating the dimming of lights based on amount of daylight available can show energy savings and details about the technology.

- Improved **staff and student performance**. Studies show that students' scores on standardized tests can increase anywhere from 18-21%. Office personnel have shown productivity improvements of up to 10%. All reasons listed above contribute to these performance improvements.

### DESIGN CONSIDERATIONS

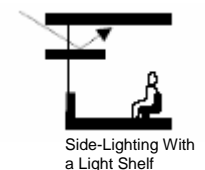
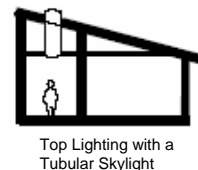
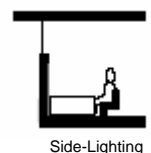
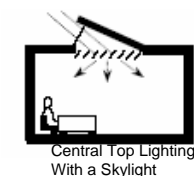
Planning daylighting strategies ideally begins as early as site plan layout. When site conditions permit, orient a new building or

addition so the main windows are facing either North or South. This provides an opportunity to take advantage of solar gain in the winter to reduce the solar gain in the summer. This orientation also allows for maximum use of sunlight to penetrate classrooms and offices.

The layout of each classroom or office is also important. Utilize surfaces that are adjacent to windows for teaching areas and computer screens to reduce the amount of glare. This technique can also be accomplished when a building is being remodeled.

Shading devices should be considered anytime that daylighting is used. Exterior shading (such as trees and shrubs), operable blinds, light shelves and diffusing glazing are all acceptable methods of shading. Shading devices both reduce glare and prevent heat gain during the cooling season.

The main ways to incorporate daylighting into a space are side-lighting and top-lighting.



Side-lighting, or providing daylight from the side, is generally accomplished with a combination of view windows and high windows. To use this method, provide light from two sides of a space preferably no more than 30 feet to 50 feet apart. Combining high windows with light shelves can extend the light farther into the space and provide some glare reduction.

Top-lighting is achieved through the use of unit skylights, tubular skylights and roof monitors in order to allow light to enter from the top of a room. Top-lighting can provide the most uniform illumination of a space. In addition to providing natural light, top-lighting also offers additional security by limiting access through the fenestration and freeing up wall space for storage or displays.

Uniform light distribution can be accomplished by combining these two methods of daylighting and implementing the appropriate shading devices to reduce glare or lighting levels as required.

## How To SAVE

Energy savings are dependent on the amount and quality of light as well as heat generated by the daylighting. As with windows, there are two ways to save energy

with daylighting: reduce electricity use due to lighting and reduced heat load and/or ventilation in the building.

Electric lighting should be wired in such a way that fixtures in or near a daylight area are able to dim or shut off automatically. Lighting should be photo-controlled in response to available daylight.

Daylighting fixtures can be integrated with the mechanical ventilation system. If skylights and windows are operable; they can provide natural ventilation into a space.

If designed correctly, daylighting can lead to reduced heating loads and therefore reduce the overall size of HVAC equipment required to satisfy a space.

## FOR MORE INFORMATION...

The Energy Observer, September 2004 issue devoted to Windows [www.michigan.gov/energyoffice](http://www.michigan.gov/energyoffice)

The Lighting Design Lab, sponsored by the Northwest Energy Efficiency Alliance, provides information and tools for evaluating Daylighting in your buildings. [www.lightingdesignlab.com](http://www.lightingdesignlab.com)

Rebuild America offers free tools and publications for evaluating equipment efficiency and building

performance at [www.rebuild.org](http://www.rebuild.org). Publication: *National Best Practices Manual for Building High Performance Schools*.

Heschong Mahone Group, Inc. has completed a series of studies on major human performance. [www.h-m-g.com/projects/daylighting/projects-PIER.htm](http://www.h-m-g.com/projects/daylighting/projects-PIER.htm)

## SHARE EXPERIENCES...

Do you have an experience that you would like to share with readers on this topic or past topics of *The Energy Observer*?

### WORKSHOP OPPORTUNITY

#### 2005 R.M.E.S. Technical Energy Analyst Workshop

January 13, 2005; Lansing, MI

more information/registration:  
[www.michigan.gov/eoworkshops](http://www.michigan.gov/eoworkshops)

Visit the Energy Office website for information on current programs, services, past issues of *The Energy Observer* and grant opportunities.  
[www.michigan.gov/energyoffice](http://www.michigan.gov/energyoffice)

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